Seung Hyeong Lee https://sites.google.com/view/leeseunghyeong
Ph.D. Candidate in Economic at Northwestern University seunghyeong.lee@u.northwestern.edu
2211 Campus Drive, Evanston, IL 60208 857-285-8012

I am writing to apply for the NBER Digital Economics and AI Tutorial. I am a fourth-year Ph.D. student in Economics at Northwestern University, with interests in finance, labor economics, and macroeconomics. I focused on finance, labor/public/organizational economics, and innovation economics during my coursework. I have two research projects directly related to digital economics and AI: examining how alternative credit scoring systems using machine learning algorithms and alternative data can promote loan access for low-income households, and generating economic agents using LLM. My other research in the dissertation focuses on integrating finance literature with macroeconomics and labor economics to provide a more comprehensive understanding of households and firms' decision-making. I am excited about the opportunity to learn in the program, and my research interests and experience make me a good fit. During the tutorial, I look forward to developing my current research projects related to digital economics and AI while applying what I learn from the training to my other research agenda.

In a paper with Kenneth Ryu and Jaehyeok Shin, I am working with a fintech firm operating in India to analyze how we can use alternative credit scoring systems to promote loan access for low-income households. Many individuals, particularly in developing countries, do not have traditional credit scores. This lack of credit history restricts low- or no-credit populations from accessing financial services, especially loans, which can be used to manage shocks. We demonstrate that transaction records and credit histories can be extracted from text messages and used to assess applicants' creditworthiness. An alternative credit scoring system built on these data and machine-learning algorithms predicts consumer delinquency 33% more accurately than traditional credit scores, with gains attributable to both algorithmic improvements and the use of alternative data. We find that this system expands credit access by approving loans for new-to-credit applicants with no bureau score and no prior loans, but the benefits of this technological shift are skewed toward financially advantaged groups due to the abundance of extractable information, rather than algorithmic bias. Applicants who stand to gain the most from providing additional information are, paradoxically, less willing to do so. Our results suggest a way to improve credit underwriting, not only by enhancing the predictability of applicants' creditworthiness but also by promoting a more inclusive system through reducing privacy friction.

In a different paper, I hope to simulate and study human decision-making processes by generating virtual economic agents through LLMs, offering cost-effective ways to estimate user responses during the early phases of survey design. To this end, with Minwoo Kang, Suhong Moon, Ayush Raj, Joseph Suh, David Chan, and John Canny, we propose a novel methodology for constructing virtual personas with synthetic user "backstories" generated as extended, multi-turn interview transcripts. This approach is justified by the theory of narrative identity which argues that personality at the highest level is constructed from self-narratives. Our generated backstories are longer, rich in detail, and consistent in authentically describing a singular individual, compared to previous methods. While previous studies have examined whether models can reflect individual opinions or attitudes, we argue that a *higher-order* binding of virtual personas requires successfully approximating not only the opinions of a user as an identified member of a group, but also the nuanced ways in which that user perceives and evaluates those outside the group. We show that virtual personas conditioned on our backstories closely replicate human response distributions and produce effect sizes that closely match those observed in the original studies. Altogether, our work extends the applicability of LLMs beyond estimating individual self-opinions, enabling their use in a broader range of human studies.

My dissertation titled Essays in Finance, Labor Economics, and Macroeconomics (Committee Members: Scott Baker, Kirabo Jackson, Giorgio Primiceri, and Bryan Seegmiller) focuses on three strands of topics: households' economic decision-making with a focus on responses to shocks, how firms' decisions

influence their employees and labor-market outcomes, and how expectations influence individuals' decision-making and market responses.

I am especially interested in how people make economic decisions, with a focus on how they respond to shocks. In a paper with Younggen Yoo, we examine the consequences that arise when a growing number of households give up on long-term financial goals, focusing specifically on the goal of homeownership. Housing affordability has declined sharply in recent decades, leading many younger generations to give up on homeownership. Using a calibrated life-cycle model matched to U.S. data, we project that the cohort born in the 1990s will reach retirement with a homeownership rate roughly 9.6 percentage points lower than that of their parents' generation. The model also shows that as households' perceived probability of attaining homeownership falls, they systematically shift their behavior: they consume more relative to their wealth, reduce labor effort, and take on riskier investments. We show empirically that renters with relatively low wealth exhibit the same patterns. These responses compound over the life cycle, producing substantially greater wealth dispersion between those who retain hope of homeownership and those who give up. We show that a targeted subsidy would lift the largest number of young renters above the "giving-up threshold" and yield welfare gains of 3.2 times greater than a uniform transfer and 10.3 times greater than a transfer targeted to the bottom 10% of the wealth distribution, while also improving homeownership rate, labor effort, and reducing social safety net reliance.

In a paper with Scott Baker, Michael Gelman, and Lorenz Kueng, we measure the effect of anticipation on consumption. We leverage exogenous income changes from various state and federal transfer policies to demonstrate that U.S. consumers tend to increase spending in advance of income arrival. These anticipatory increases (pre-MPCs) are small compared to the substantial increases observed following income receipt (post-MPCs), but respond to the salience of the payment event. Individuals exhibit significant heterogeneity in anticipatory spending responses and these responses are persistent within individuals over time, suggesting that much of the correlation between MPCs and financial characteristics like liquidity is driven by personality traits. Utilizing this additional dimension of consumption response across multiple policy-induced income changes per individual, we cluster individuals into distinct types. These types' behavior and characteristics correspond roughly to rational (about 45%), mental accounting (24%), rationally inattentive (21%), and present-biased consumers (9%). We find that a number of untargeted characteristics are well captured by this clustering, with present-biased and mental accountants having much lower levels of liquidity, income, and financial market participation than rational and rationally inattentive individuals. Moreover, increases in available financial resources increase the smoothness of consumption surrounding these transfer payments, with present-biased individuals most strongly pulling spending from the post-payment period into the pre-payment period.

In addition to studying households' economic decision-making, I am also interested in firms' effects on workers. In a paper with Bryan Seegmiller, Yufeng Wu, and Miao Ben Zhang, we examine the role of firms' intangible capital investments in fostering the growth of employee human capital and the subsequent spillover effects on other firms. Using U.S. Census Bureau employee-employer matched data, we provide the first direct evidence that firms' investments in intangibles significantly enhance the human capital of their employees, designating these firms as "human capital incubators." We develop a model in which workers' preferences for skill development influence their career decisions, thereby shaping the labor supply to firms. Firms recognize this by investing in intangibles not only to boost output but also to attract talent. We validate the model by demonstrating that human capital incubation is positively correlated with firm productivity, profitability, and market power, as well as with greater inflows of younger workers. Our model estimation reveals that incubator firms capture 37% of the value generated from their investments in

employees' human capital, while the remaining 63% of this value spills over to other firms that hire their workers. Additionally, 29% of the production value of intangible investment is embodied directly in the skills of employees.

In a project with Nuri Ersahin and Hyunseob Kim, we analyze how the location of a firm's headquarters, and particularly the degree of its agglomeration, influences the firm's production processes and overall productive efficiency. To examine how headquarters agglomeration affects a firm's production process and productive efficiency, we draw on establishment-level data from the U.S. Census Bureau. We show that firms whose key decision-making unit (headquarters) is situated in a small area tend to be less productive. We analyze that the inefficiencies are coming from differences in product input usage (i.e., using more labor relative to capital) and tend to undergo less efficient restructuring. These effects extend beyond the local spillovers between establishments (effects of local agglomeration) through spillovers from headquarters to subsidiary plants (effects of headquarters agglomeration), which our research highlights.

Lastly, I am interested in how expectations influence individuals' decision-making and market responses. In a paper with Jingoo Kwon and Younggeun Yoo, we propose a novel approach to agents' subjective uncertainty and cross-sectional disagreement. Even though subjective uncertainty and disagreement are distinct concepts, they are often used interchangeably in empirical research due to the challenge of measuring subjective uncertainty as a separate factor. We propose a method to separately quantify disagreement and subjective uncertainty at firm and fiscal quarter levels using equity analyst forecasts. Our method exploits heterogeneity in how much dispersion in the point estimates decreases shortly after the introduction of a signal that is perceived to be informative and yields homogeneous interpretation by most agents. Intuitively, such a decrease in dispersion would be greater if agents had higher subjective uncertainty in their beliefs prior to receiving the signal. We use the estimated measures of disagreement and subjective uncertainty to show how they jointly affect stock market volatility, returns, and trading volume. Subjective uncertainty is positively correlated with volatility when disagreement is low, but this relationship reverses and the correlation becomes negative when disagreement is high. Furthermore, disagreement and subjective uncertainty have opposite yet interactive effects on returns and trading volume. Stocks with higher disagreement earn lower returns and exhibit higher trading volumes, with these effects amplified 2-3 times when subjective uncertainty is low. Conversely, stocks with higher subjective uncertainty earn higher returns and experience lower trading volumes, with these effects similarly amplified when disagreement is high. We provide a theoretical framework and perform numerical simulations to explain our empirical findings.

NBER Digital Economics and AI Tutorial is an ideal opportunity for me to continue building on my research interests. Lectures from outstanding faculty will help me delve more deeply into my current fields of interest and explore a diverse array of related topics. Interacting with fellow attendees, I will also be able to refine my current research projects and build a foundation for future collaborations. I am eager to learn in the tutorial as a student aspiring to become an academic economist, and to contribute to the intellectual community working on digital economics and AI.